

(19) World Intellectual Property  
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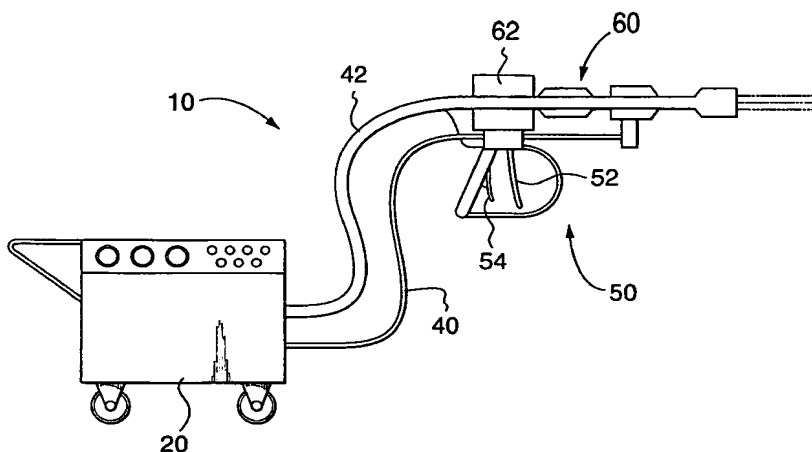
(43) International Publication Date  
12 May 2005 (12.05.2005)

PCT

(10) International Publication Number  
**WO 2005/042177 A1**

- (51) International Patent Classification<sup>7</sup>: **B08B 3/02**, B05B 3/04, 12/06
- (21) International Application Number: PCT/CA2003/001683
- (22) International Filing Date: 3 November 2003 (03.11.2003)
- (25) Filing Language: English
- (26) Publication Language: English
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ULTRASONIC WATERJET APPARATUS



(57) Abstract: An ultrasonic waterjet apparatus (10) has a mobile generator module (20) and a high-pressure water hose (40) for delivering high-pressure water from the mobile generator module (20) to a hand-held gun (50) with a trigger and an ultrasonic nozzle (60). An ultrasonic generator in the mobile generator module (20) transmits high-frequency electrical pulses to a piezoelectric or magnetostrictive transducer (62) which vibrates to modulate a high-pressure waterjet flowing through the nozzle (60). The waterjet exiting the ultrasonic nozzle (60) is pulsed into mini slugs of water, each of which imparts a waterhammer pressure on a target surface. The ultrasonic waterjet apparatus (10) may be used to cut and de-burr materials, to clean and de-coat surfaces, and to break rocks. The ultrasonic waterjet apparatus (10) performs these tasks with much greater efficiency than conventional continuous-flow waterjet systems because of the repetitive waterhammer effect. A nozzle with multiple exit orifices or a rotating nozzle (76) may be provided in lieu of a nozzle with a single exit orifice to render cleaning and de-coating large surfaces more efficient. A water dump valve (27) and controlling solenoid are located in the mobile generator module (20) rather than the gun (50) to make the gun lighter and more ergonomic.



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